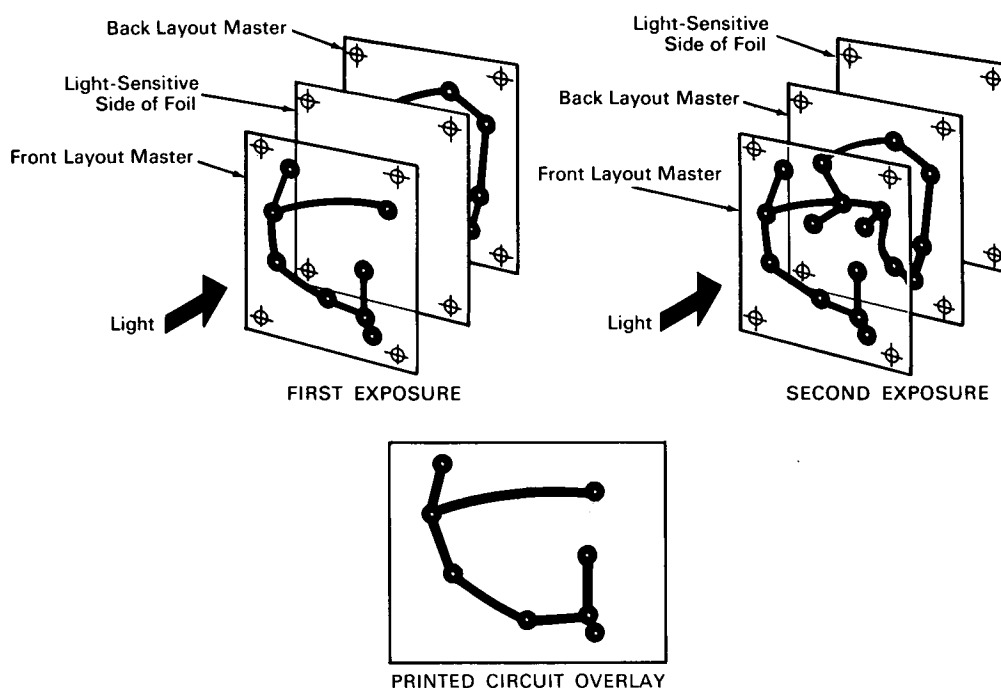


NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Front and Back Printed Circuit Layouts Presented on Single Sheet



The problem: To reproduce the circuit layouts on the front and back of a printed circuit board as overlays on one surface of a sheet. Overlay images of the two circuits on one sheet would serve as a time-saving visual aid to technicians and others concerned with the assembly and testing of the electronic modules and study of the overall circuitry.

The solution: A double-exposure method in which the front and back circuits are reproduced as images of different intensity on a single sheet. A conventional diazo process is used for development of the foil on which the overlays are imaged.

How it's done: Drawings of the printed circuit layouts are made on two sheets of clear plastic masters, one sheet for the front circuit layout and the other for the back circuit layout. Black photographic tape and reference markers are used for front-to-back registration of the clear plastic masters. A light-sensitive diazo foil is placed between the masters, with the sensitive side of the foil facing the master containing the front layout. The resulting sandwich is then stapled together and placed in a contact copier so that the front layout faces a bank of ultraviolet lights. After exposure, the sandwich is taken from the copier

(continued overleaf)

and the foil is removed and placed behind the two masters so that its sensitive side is in direct contact with the master containing the back layout. The front-layout master is registered over the back-layout master, which is in contact with the sensitive side of the foil. This sandwich is then positioned in the copier, with the sensitive side of the film facing the lights, and exposed for a prescribed time. After the second exposure, the foil is removed and developed in ammonia vapor.

On the finished print, illustrated above, the darker front-circuit layout can easily be distinguished from the lighter back-circuit layout.

Notes:

1. Although the method described above uses the diazo process, other photographic processes can also be used.
2. In lieu of line drawings on clear plastic, the masters can consist of diazo transparencies, photographic film positives, or drawings on tracing paper.

3. Drawings of electronic components, notes, and instructions may be included on the front plastic layout or on the mat side of the foil prior to exposure.
4. This method should have widespread application in the preparation of illustrations as teaching aids and guides for construction and maintenance of complex devices.
5. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
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Reference: B63-10596

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: J.H. Perry
(GSFC-93)